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Reconstruction and Modelling of Cylinder Test Wall Expansion from Heterodyne Velocimetry Data ALEXANDER HODGSON, AWE — The 'cylinder test' is comprised of a cylinder of explosive encased in a copper tube and detonated at one end. Analysis of the copper wall expansion can be used to generate a JWL equation of state for the explosive. The wall arrival times are traditionally measured using angled probe boards. These times are converted to radial expansion times using the measured steady state detonation velocity. This expansion represents the intersection of the wall with a radial line, hence its differential is the radial intersection velocity. The true radial wall velocity is different due to the small component of particle velocity along the axis. Wall velocities can be directly measured using a Heterodyne Velocimetry (HetV) diagnostic, to a high degree of temporal resolution. However, the wall profile cannot be reconstructed from a standard HetV probe due to a lack of spatial information. This work describes how velocity traces from two HetV probes at different angles can be combined to evaluate the path of a particle on the copper wall, and how the wall profile may then be reconstructed. The method is applied to data from cylinder test experiments on a conventional high explosive. Results are validated using hydrocode modelling coupled with Detonation Shock Dynamics theory.

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